## Problem/Research Questions #1

What are the best designs for a balloon-powered vehicle that will need to roll a distance of at least 3 meters? What design variables are important to consider when designing and testing a balloon-powered vehicle to move at the fastest speed possible?

## Materials you will have available: (The caps and scissors must be returned)

**1 - 5 x 8 index card**

**2 – PowerAde/drink bottle caps**

**2 – Balloons**

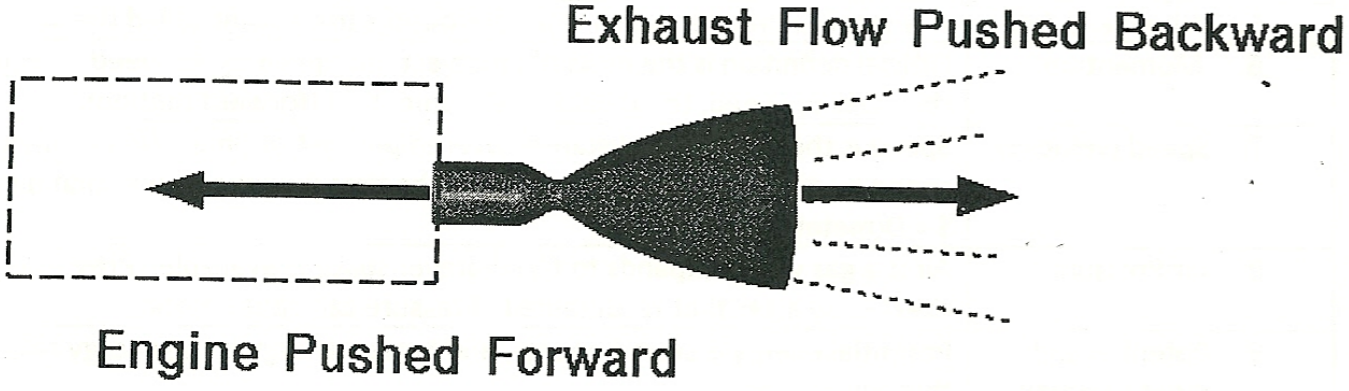
**1 – Plastic straw**

**1 - Wooden skewer**

**Tape and scissors**

Read the information below and discuss with your partner(s) how this information can be useful when you design your car.

# Rocket Engine Thrust




***For every action, there is an equal and opposite re-action.***

Sir Isaac Newton first presented his three laws of motion in the "Principia Mathematica Philosophiae Naturalis" in 1686. His third law states that for every action (force) in nature there is an equal and opposite reaction. In other words, if object A exerts a force on object B, then object B also exerts an equal and opposite force on object A. Notice that the forces are exerted on different objects.

In aerospace engineering, the principal of action and reaction is very important. Newton's third law explains the generation of thrust by a rocket engine. In a rocket engine, hot exhaust gas is produced through the combustion of a fuel with an oxidizer. The hot exhaust gas flows through the rocket nozzle and is accelerated to the rear of the rocket. In reaction, a thrusting force is produced on the engine mount. The thrust accelerates the rocket as described by Newton's second law of motion.